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EXAMINER

KNAUSS, SCOTT A

ART UNIT

PAPER NUMBER

2874

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/656,092

Applicant(s)

MITCHELL ET AL.

Examiner

Scott A Knauss

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The references cited in the information disclosure statement have been considered.

### ***Drawings***

2. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

### ***Claim Rejections - 35 USC § 112***

3. Claim 30 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how a reflective surface can be both perpendicular to an incident beam of light (claim 25) and placed at a 45 degree angle to the incident beam of light.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

Art Unit: 2874

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,259,835 to Jing in view of U.S. Patent No. 6,275,325 to Sinclair.

7. Regarding claim 1 Jing teaches an optical system in fig. 4 having an array of stationary optical fibers (#54a-n) constructed and arranged to conduct one of a plurality of light beams including a selected light beam, an array of movable reflective surfaces (#88a-n) which move into the path of the selected light beam so that the selected light beam will be directed to a light beam receptor (#50), in this case another optical fiber, and a plurality of actuators (#40a-n) on which the reflective surfaces are mounted..

8. Jing does not, however, disclose the use of thermal actuators for moving a reflective surface by the application of electrical or thermal energy.

9. Sinclair, on the other hand, discloses a thermally activated actuator for moving reflective devices such as a mirror (fig. 20, #200, abstract, line 4).

10. Therefore it would have been obvious to one of ordinary skill in the art to substitute alternate actuating means in the optical system disclosed by Jing, such as by using the thermal actuator disclosed by Sinclair, for the purpose of moving a reflective device.

11. Regarding claim 2, the actuating means disclosed by Sinclair would inherently be frictionless since there no parts moving against each other.

12. Regarding claim 3, Sinclair disclosing using a actuator extending over a substrate in a cantilever fashion, which is the same as having a cantilever mounting.

13. Regarding claim 4, Jing discloses selecting among beams of light by changing the actuator (#58ba-n) to which an electrical voltage generated by control unit (#44) is applied (column 6, lines 1-5).

14. Regarding claim 5, Jing discloses a plurality of collimating lenses (fig. 4, #'s 64a-n) associated with each one of the stationary optical fibers.

15. Regarding claim 6, Jing discloses a collimating lens (fig. 4, #62) on a receptor fiber.

16. Regarding claim 7, Sinclair further discloses a thermal actuator comprising a silicon based beam (column 2, line 36 fig. 20 # 224) sandwiched between two layers of material (#226, #206) having differing coefficients of thermal expansion. (column 2, lines 34-40).

18. Regarding claim 8, Sinclair discloses a thermal actuator comprising a silicon based beam (column 2, line 36 fig. 20 # 224) which is attached to single layer of material (the layer attached to #206) which has a different composition and thus a different coefficient of thermal expansion.

19. Regarding claim 9, Sinclair further discloses a thermal actuator comprising a silicon wafer (fig. 20, #206), sacrificial layers (column 8, lines 23-25), a material with a

first coefficient of thermal expansion (#226, column 2, lines 34-40) and a material with a second coefficient of thermal expansion (#224, column 2, lines 34-40).

20. Regarding claim 10, Jing further discloses in fig. 4 mounting a plurality of optical fibers in a fixed array (#72a-n), mounting a plurality of movable reflective surfaces (#88a-n) on individual actuators (#58a-n, 74a-m), and energizing a actuator to cause a movable reflective surface to intersect a selected light beam emanating from one of the optical fibers and directing the light beam to a light beam receptor (#50).

21. Jing does not, however, disclose the use of thermal actuators for moving a reflective surface.

22. Sinclair, on the other hand, discloses a thermally activated actuator for moving reflective devices such as a mirror (abstract, line 4).

23. Therefore it would have been obvious to one of ordinary skill in the art to substitute alternate actuating means in the optical system disclosed by Jing, such as a thermal actuator as disclosed by Sinclair, for the purpose of moving a reflective device.

24. Regarding claim 11, the actuating means disclosed by Sinclair would inherently be frictionless since there are no parts moving against each other.

25. Regarding claim 12, Sinclair disclosing using a actuator extending over a substrate in a cantilever fashion, which is the same as having a cantilever mounting.

26. Regarding claim 13, Sinclair discloses a thermal actuator having bimorph beams (fig. 20 #226, #224) which are composites (comprising multiple materials) (column 2, lines 56-61).

27. Regarding claim 14, Sinclair discloses a thermal actuator comprising a silicon based beam (column 2, line 36 fig. 20 # 224) sandwiched between two layers of material (#226, #206) having differing coefficients of thermal expansion. (column 2, lines 34-40).

28. Regarding claim 15, Sinclair discloses a thermal actuator comprising a silicon based beam (column 2, line 36 fig. 20 # 224) which is attached to single layer of material (the layer attached to #206) which has a different composition and thus a different coefficient of thermal expansion.

29. Regarding claim 16, Sinclair further discloses a thermal actuator comprising a silicon wafer (fig. 20, #206), sacrificial layers (column 8, lines 23-25), a material with a first coefficient of thermal expansion (#226, column 2, lines 34-40) and a material with a second coefficient of thermal expansion (#224, column 2, lines 34-40).

30. Claims 17-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,091,867 to Young et al. in view of Sinclair.

31. Regarding claim 17 Young discloses in fig. 7 an optical switch in use in directing a beam of light to a receptor (#110), and additionally discloses the use of reflective surfaces which are initially parallel to a beam of light (fig. 9, #120-I), and are bent into a second position (120-(I+1)) intersecting the light beam when the switch is operated to reflect a light beam to a receptor (#110). Young also discloses using a plurality of actuating means (#125) but does not specify a thermally operated actuating means comprising cantilever beams.

Art Unit: 2874

32. Sinclair, on the other hand, discloses in fig. 20 an energy sensitive flexible cantilever beam (#224, #226), which is constructed to move a mirror (#200) between two positions.

33. Therefore it would have been obvious to one of ordinary skill in the art to use alternate actuating means, such as the cantilever mechanism taught by Sinclair, for the purpose of moving a reflective surface between a first position parallel to a beam of light and a second position intersecting the beam of light to reflect the light to a receptor.

34. Regarding claim 18, the cantilever mechanism disclosed by Sinclair would inherently be frictionless since there are no parts moving against each other.

35. Regarding claim 19, Young discloses a method of operating an optic switch by selecting an actuator to select among a plurality of light beams (column 6, lines 48-53) to travel to a receptor (#110). Although Young does not explicitly disclose selecting the light beams by selecting the actuator to which energy is directed, it is inherent that an electrical signal would be used to effect switching in the actuating means.

36. Therefore it would have been obvious to one of ordinary skill in the art to selectively supply a control signal (energy) to the energy sensitive cantilever mechanism as disclosed by Sinclair for the purpose of switching a reflective surface.

37. Regarding claim 20, Sinclair further discloses a thermal actuator comprising a silicon based beam (column 2, line 36 fig. 20 # 224) sandwiched between two layers of material (#226, #206) which are made of different materials and thus have differing coefficients of thermal expansion (column 2, lines 34-40).



38. Regarding claim 21, Sinclair discloses a cantilever mechanism comprising a silicon based beam (column 2, line 36 fig. 20 # 224) which is attached to single layer of material (the layer attached to #206) which has a different composition and thus a different coefficient of thermal expansion.

39. Regarding claim 22, Sinclair further discloses a thermal actuator comprising a silicon wafer (fig. 20, #206), sacrificial layers (column 8, lines 23-25), a material with a first coefficient of thermal expansion (#226, column 2, lines 34-40) and a material with a second coefficient of thermal expansion (#224, column 2, lines 34-40).

40. Regarding claim 23, Sinclair discloses an energy sensitive flexible backing (beam) including a pair of substantially parallel polysilicon (dielectric) structural layers (fig. 20 #226, 224), separated by an air layer (between the two layers). Sinclair additionally discloses that the structural layers may include metal coatings (conducting layers) (column 2, line 61).

41. Regarding claim 24, Sinclair discloses actuating arms (#226, #224) having different resistivity (column 2, lines 37-38), and thus would inherently have a different current density when connected to a source of electrical energy.

42. Regarding claim 25 Young discloses in fig. 7 an optical switch in use in directing a beam of light to a receptor (#110), and additionally discloses the use of reflective surfaces which could be considered to be arrayed in a perpendicular direction to an incident beam of light, if the reflective surfaces are considered to extend in a plane that extends upwardly and the beam is considered to extend in a plane that extends horizontally (the two planes thus being perpendicular), Young further discloses and are

Art Unit: 2874

bent into a second position (120-(l+1)) intersecting the light beam when the switch is operated to reflect a light beam to a receptor (#110). Young also discloses using a plurality of actuating means (#125) but does not specify a thermally operated actuating means comprising cantilever beams.

43. Sinclair, on the other hand, discloses in fig. 20 an energy sensitive flexible cantilever beam (#224, #226), which is constructed to move a mirror (#200) between two positions.

44. Therefore it would have been obvious to one of ordinary skill in the art to use alternate actuating means, such as the cantilever mechanism taught by Sinclair, for the purpose of moving a reflective surface between a first position perpendicular to a beam of light and a second position intersecting the beam of light to reflect the light to a receptor.

45. Regarding claim 26, Sinclair discloses in fig. 20 energy sensitive flexible cantilever beams (#224, #226) including a polysilicon (dielectric) structural layer, which is attached to a second member having a conducting layer (column 2, lines 56-59).

46. Regarding claim 27, Sinclair discloses a dielectric structural layer composed of polysilicon (column 4, lines 26-27) which would inherently include either single or polycrystalline silicon.

47. Regarding claim 28, Sinclair discloses an energy sensitive flexible backing (beam) including a pair of substantially parallel polysilicon (dielectric) structural layers (fig. 20 #226, 224), separated by an air layer (between the two layers). Sinclair

additionally discloses that the structural layers may include metal coatings (conducting layers) (column 2, line 61).

48. Regarding claim 29, Sinclair discloses actuating arms (#226, #224) having different resistivity (column 2, lines 37-38), and thus would inherently have a different current density when connected to a source of electrical energy.

49. Regarding claim 30, Young discloses reflective surfaces placed at 45 degrees to incident light. (column 6, line 56).

#### ***Remarks***

50. Regarding independent claims 17 and 25, it is not clear to the examiner what the applicant is intending to claim by having reflective devices either parallel (17) or perpendicular (25) to an incident light beam. The examiner suggests claiming reflective surfaces that are either parallel or perpendicular to the silicon wafer (which may or may not be allowable) as disclosed in the specification.

#### ***Conclusion***

51. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,960,132 to Lin discloses another example of a switch using actuators to select between inputs.

52. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Knauss whose telephone number is (703) 305-5043. The examiner can normally be reached on 9-6 Monday-Friday.

Art Unit: 2874


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (703) 308 - 4819. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Scott Knauss

Art Unit 2874

sak  
December 6, 2001

  
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REGISTERED PATENT ATTORNEY